TROEMNER
Henry Troemner LLC

Calibration Certificate

201 Wolf Drive • P.O. Box 87 • Thorofare, NJ 08086-0087 • Phone: 856-686-1600 • Fax: 856-686-1601 • www.troemner.com • e-mail: troemner@troemner.com

Weight
ID Number 4000014465
Certificate Number 696639-1
Date of Calibration 11-DEC-2012

SECTION 1: NAME AND ADDRESS OF CUSTOMER

End user
State of Vermont
103 S Main Street
Waterbury VT 05671-9800

Client
Fisher Scientific (Pittsburgh)
P.O. Box 1768
Pittsburgh PA 15230

SECTION 2: APPROVED SIGNATORY

Joseph Moran, Metrology Manager

SECTION 3: PERSON PERFORMING WORK

Teresa D'Costa

SECTION 4: CERTIFICATE INFORMATION

Description of Masses: Analytical Weight Set

Accuracy Class	: ASTM E617-97 Class 1	Date Received	: 11-DEC-2012
Order Number	: DR3116589	Date of Calibration	: 11-DEC-2012
Construction	: One Piece, Two Piece	Date of Issue	: 12-DEC-2012
Material	: Stainless Steel	Weight Range	: 50g - 1g
	: Stainless Steel		: 500mg - 10mg
Serial Number	: 4000014465		

SECTION 5: ENVIRONMENTAL CONDITIONS DURING TEST

Temperature: 20.98°C Pressure: 759.60 mm Hg Relative Humidity: 46%

SECTION 6: PERTINENT INFORMATION

The Weights listed on this calibration report have been compared to reference mass standards that are directly traceable to the National Institute of Standards and Technology under Test No. 822-275872-11.

Reference standards and balances used to perform the calibration are listed in Section 10.

The weights calibrated for this report have been calibrated in accordance with Troemner's calibration process. The calibration performed meets Level I criteria as described in the NIST/NVLAP Technical Guide 150-2.

This calibration also meets specifications as outlined in ISO 9001, ISO/IEC 17025, ANSI/NCSL Z540-1-1994, NRC Document 10CFR50 Appendix B, and applicable documents.

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SECTION 7: TRUE MASS (MASS IN VACUUM) CALIBRATION DATA

Nominal Mass Value	Serial Number	True Mass	Density[1] of Weight	Uncertainty (+ or -)
50 g		50.000050 g	8.0300 g/cm^3	0.022 mg
20 g		19.999999 g	8.0300 g/cm^3	0.017 mg
20 g *		20.000006 g	8.0300 g/cm^3	0.017 mg
10 g		10.000005 g	8.0300 g/cm^3	0.012 mg
5 g		5.0000015 g	8.0300 g/cm^3	0.0050 mg
2 g		2.0000188 g	8.0300 g/cm^3	0.0050 mg
2 g *		2.0000028 g	8.0300 g/cm^3	0.0050 mg
1 g		1.0000117 g	8.0300 g/cm^3	0.0045 mg
500 mg		0.5000052 g	7.9500 g/cm^3	0.0025 mg
200 mg		0.2000063 g	7.9500 g/cm^3	0.0025 mg
200 mg *		0.2000013 g	7.9500 g/cm^3	0.0025 mg
100 mg		0.1000047 g	7.9500 g/cm^3	0.0025 mg
50 mg		0.0500063 g	7.9500 g/cm^3	0.0022 mg
20 mg		0.0200043 g	7.9500 g/cm^3	0.0022 mg
20 mg *		0.0200048 g	7.9500 g/cm^3	0.0022 mg
10 mg		0.0100048 g	7.9500 g/cm^3	0.0022 mg

1 Density is assumed unless otherwise stated
* Denotes weight is marked with a dot

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SECTION 8: MASS IN AIR CALIBRATION VALUE VS. REFERENCE DENSITY 8000 kg m^{-3}

Nominal Mass Value	Serial Number	Conventional Mass Value	Uncertainty (+ or -)	Tolerance (+ or -)
50 g		50.000078 g	0.022 mg	0.1200 mg
20 g		20.000010 g	0.017 mg	0.0740 mg
20 g *		20.000017 g	0.017 mg	0.0740 mg
10 g		10.000011 g	0.012 mg	0.0500 mg
5 g		5.0000043 g	0.0050 mg	0.0340 mg
2 g		2.0000199 g	0.0050 mg	0.0340 mg
2 g *		2.0000039 g	0.0050 mg	0.0340 mg
1 g		1.0000122 g	0.0045 mg	0.0340 mg
500 mg		0.5000047 g	0.0025 mg	0.0100 mg
200 mg		0.2000061 g	0.0025 mg	0.0100 mg
200 mg *		0.2000011 g	0.0025 mg	0.0100 mg
100 mg		0.1000046 g	0.0025 mg	0.0100 mg
50 mg		0.0500063 g	0.0022 mg	0.0100 mg
20 mg		0.0200043 g	0.0022 mg	0.0100 mg
20 mg *		0.0200048 g	0.0022 mg	0.0100 mg
10 mg		0.0100048 g	0.0022 mg	0.0100 mg

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SECTION 9: MASS IN AIR CALIBRATION DATA VS. REFERENCE DENSITY 8000 kg m^{-3}

Nominal Mass Value	Serial Number	Conventional Mass Correction	Uncertainty (+ or -)	Tolerance (+ or -)
50 g		0.078 mg	0.022 mg	0.1200 mg
20 g		0.010 mg	0.017 mg	0.0740 mg
20 g *		0.017 mg	0.017 mg	0.0740 mg
10 g		0.011 mg	0.012 mg	0.0500 mg
5 g		0.0043 mg	0.0050 mg	0.0340 mg
2 g		0.0199 mg	0.0050 mg	0.0340 mg
2 g *		0.0039 mg	0.0050 mg	0.0340 mg
1 g		0.0122 mg	0.0045 mg	0.0340 mg
500 mg		0.0047 mg	0.0025 mg	0.0100 mg
200 mg		0.0061 mg	0.0025 mg	0.0100 mg
200 mg *		0.0011 mg	0.0025 mg	0.0100 mg
100 mg		0.0046 mg	0.0025 mg	0.0100 mg
50 mg		0.0063 mg	0.0022 mg	0.0100 mg
20 mg		0.0043 mg	0.0022 mg	0.0100 mg
20 mg *		0.0048 mg	0.0022 mg	0.0100 mg
10 mg		0.0048 mg	0.0022 mg	0.0100 mg

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SECTION 10: CALIBRATION PROCEDURE DATA

Nominal Mass Value	Serial Number	Standard Set No.	Cal Due	Balance Used	Cal Due	Procedure Used
50 g		C006A	06/30/13	AT106-123	05/31/13	Multi A-B
20 g		C006A	06/30/13	AT106-123	05/31/13	Multi A-B
20 g *		C006A	06/30/13	AT106-123	05/31/13	Multi A-B
10 g		C006A	06/30/13	AT106-123	05/31/13	Multi A-B
5 g		C006	06/30/13	MX5-121A	05/31/13	Multi A-B
2 g		C006	06/30/13	MX5-121A	05/31/13	Multi A-B
2 g *		C006	06/30/13	MX5-121A	05/31/13	Multi A-B
1 g		C006	06/30/13	MX5-121A	05/31/13	Multi A-B
500 mg		C006	06/30/13	MX5-121A	05/31/13	Multi A-B
200 mg		C006	06/30/13	MX5-121A	05/31/13	Multi A-B
200 mg *		C006	06/30/13	MX5-121A	05/31/13	Multi A-B
100 mg		C006	06/30/13	MX5-121A	05/31/13	Multi A-B
50 mg		C006	06/30/13	MX5-121A	05/31/13	Multi A-B
20 mg		C006	06/30/13	MX5-121A	05/31/13	Multi A-B
20 mg *		C006	06/30/13	MX5-121A	05/31/13	Multi A-B
10 mg		C006	06/30/13	MX5-121A	05/31/13	Multi A-B

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SECTION 11: GENERAL INFORMATION

This calibration was performed in Troemner's High Precision Level I Mass Metrology Laboratory at 201 Wolf Drive, Thorofare, New Jersey 08086 unless otherwise noted on page one. The internal procedures used are CAL-CLASSI and NIST HB145.

SECTION 12: DEFINITIONS AND TERMS

MASS IN A VACUUM - The mass of a weight as if it were measured in a vacuum. Also known as True Mass.

MASS IN AIR - The conventional value of the result of weighing in air, in accordance to International Recommendation OIML D 28. For a weight taken at 20° C, the conventional mass is the mass of a reference weight of a density of 8000 $kg \cdot m^{-3}$ which it balances in air of a density of 1.2 $kg \cdot m^{-3}$.

AS FOUND MASS IN A VACUUM - The measured value of the mass(es) as they were received by Troemner.

AS LEFT MASS IN A VACUUM - The measured value of the mass(es) after they were adjusted, repaired or replaced when necessary. The As Found Mass in a Vacuum will equal the As Left Mass in a Vacuum if the mass(es) did not require adjustment, repair or replacement.

NOMINAL MASS - The mass value as marked on the weight.

CORRECTION - The difference between the mass value of a weight and its nominal value. A positive correction indicates that the mass value is greater than the nominal value by the amount of the correction.

AS FOUND CONVENTIONAL MASS CORRECTION - The conventional correction of the result, as it was received by Troemner, of weighing in air in accordance to International Recommendation D 28. For a weight taken at 20° C, the conventional mass is the mass of a reference weight of density 8000 $kg \cdot m^{-3}$ which it balances in air density of 1.2 $kg \cdot m^{-3}$. If the customer requires cleaning prior to calibration, the after cleaning correction would be reported.

AS LEFT CONVENTIONAL MASS CORRECTION - The conventional correction of the result, after adjust-, ment repair, or replacement of weighing in air in accordance to International Recommendation D 28. For a weight taken at 20° C, the conventional mass is the mass of a reference weight of density 8000 $kg \cdot m^{-3}$ which it balances in air density of 1.2 $kg \cdot m^{-3}$. The As Found will equal the As Left Conventional Mass Correction if the mass(es) did not require adjustment, repair or replacement.

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SECTION 12: DEFINITIONS AND TERMS (continued)

UNCERTAINTY - The standard deviation associated with the result of the measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurand. The uncertainty is calculated in accordance with NIST TechNote 1297 / UKAS M3003 using a coverage factor of $k = 2$ ($k = 2$ defines an interval having a level of confidence of approximately 95 percent). The uncertainty does not include possible effects of magnetism.

TOLERANCE - Defines the limits in which the correction value and the uncertainty must fall to meet the tolerance specification for the given Class.

AS FOUND CONVENTIONAL MASS VALUE - The measured value of the mass(es) as they were received by Troemner, of weighing in air in accordance to International Recommendation OIML D 28. For a weight taken at 20° C, the conventional mass is the mass of a reference weight of density 8000 $kg \cdot m^{-3}$ which it balances in air density of 1.2 $kg \cdot m^{-3}$. If the customer requires cleaning prior to calibration, the after cleaning value would be reported. F denotes Out of Tolerance Weight.

AS LEFT CONVENTIONAL MASS VALUE - The measured value of the mass(es) after they were adjusted, repaired or replaced when necessary, of weighing in air in accordance to International Recommendation OIML D 28. For a weight taken at 20° C, the Conventional Mass is the mass of a reference weight of density 8000 $kg \cdot m^{-3}$ which it balances in air density of 1.2 $kg \cdot m^{-3}$. The As Found will equal the As Left Conventional Mass Value if the mass(es) did not require adjustment, repair or replacement.

ASTM E617-97 - Weights meet the tolerance specification for ASTM E617-97. Weights 2kg - 1g screened for magnetism using a Gaussmeter.